

**App. No.** : 10/601,037  
**Filed** : June 19, 2003

### **AMENDMENTS TO THE CLAIMS**

Please cancel Claims 1-3 and 5-14. Claims 4, 25, and 26 were previously cancelled.

1. – 14. (Cancelled).

15. (Previously Presented) A method of forming a gate stack in an integrated circuit comprising:

depositing a dielectric layer over a substrate comprising a first region and a second region by an atomic layer deposition process;

depositing a barrier layer directly over the dielectric layer by an atomic layer deposition process such that it overlies both the first and second regions; and

forming a first gate electrode layer over the first region of the substrate and a second gate electrode layer over the second region.

16. (Original) The method of Claim 15, wherein the first region is a PMOS region and the second region is an NMOS region.

17. (Original) The method of Claim 15, wherein the first and second gate electrode layers are adjacent to each other

18. (Original) The method of Claim 15, wherein the first gate electrode layer comprises a first gate electrode material and the second gate electrode layer comprises a second gate electrode material.

19. (Original) The method of Claim 18, wherein the first and second gate electrode materials are conductive.

20. (Original) The method of Claim 18, wherein the first and second gate electrode materials are different.

21. (Original) The method of Claim 18, wherein the first and second gate electrode materials are selected from the group consisting of poly-silicon, Ti, Ni, Al, W, Pt, Co, TiN, TiAl<sub>x</sub>N<sub>y</sub>, TaN, TaAl<sub>x</sub>N<sub>y</sub>, Ru, RuO<sub>2</sub>, Ir, IrO<sub>2</sub>, HfN, WN<sub>x</sub>C<sub>y</sub>, HfAl<sub>x</sub>N<sub>y</sub> and HfSi<sub>x</sub>N<sub>y</sub>.

22. (Original) The method of Claim 19 wherein either the first or second gate electrode material is a metal nitride.

23. (Original) The method of Claim 15, wherein the barrier layer comprises a conductive material.

App. No. : 10/601,037  
Filed : June 19, 2003

24. (Original) The method of Claim 23, wherein the conductive material is selected from the group consisting of Ti, Ni, Al, W, Pt, Co, TiN,  $TiAl_xN_y$ , TaN,  $TaAl_xN_y$ , Ru,  $RuO_2$ , Ir,  $IrO_2$ , HfN,  $WN_xC_y$ ,  $HfAl_xN_y$  and  $HfSi_xN_y$ .

25. (Cancelled)

26. (Cancelled)

27. (Original) The method of Claim 15, wherein the barrier layer is deposited to a thickness of less than about 100 Å.

28. (Original) The method of Claim 27, wherein the barrier layer is deposited to a thickness of less than about 30 Å.

29. (Original) The method of Claim 15, additionally comprising treating the dielectric layer to remove OH groups on the surface prior to deposition of the barrier layer.

30. (Original) The method of Claim 29, wherein the dielectric layer is treated with ammonia gas.

31. (Original) The method of Claim 29, wherein the dielectric layer is treated with radicals.

32. (Original) The method of Claim 31, wherein the dielectric layer is treated with nitrogen-hydrogen plasma.

33. (Original) The method of Claim 15, wherein forming a first gate electrode layer over the first region comprises depositing a layer of first gate electrode material over the first and second regions of the substrate.

34. (Original) The method of Claim 33, wherein forming a first gate electrode layer over the first region additionally comprises removing first gate electrode material from over the second region of the substrate without removing the underlying barrier layer.

35. (Original) The method of Claim 34, wherein the first gate electrode material is removed from over the second region of the substrate by chemical mechanical polishing.

36. (Original) The method of Claim 34, wherein forming the second gate electrode layer comprises depositing a layer of second gate electrode material over the first and second regions of the substrate.

37. (Original) The method of Claim 34, wherein the first gate electrode material is removed from over the second region of the substrate by differential etching.

App. No. : 10/601,037  
Filed : June 19, 2003

38. (Original) The method of Claim 37, wherein forming the second gate electrode layer over the second region comprises depositing a layer of second gate electrode material over the first and second regions of the substrate and removing second gate electrode material from over the first region without removing the underlying barrier layer.

39. (Original) The method of Claim 15, additionally comprising depositing a layer of conductive material over the first and second gate electrode layers.

40. (Original) The method of Claim 15, wherein forming a first gate electrode over the first region of the substrate comprises etching the barrier layer over the second region to a thickness of no more than about 100 angstroms.

41. (Original) The method of Claim 40, wherein forming a second gate electrode over the second region of the substrate comprising depositing a layer of conductive material over the second region.

42. (Previously Presented) A method of forming a first and second electrode in an integrated circuit comprising:

depositing a dielectric layer over a substrate comprising a first region and a second region;

depositing a barrier layer directly over the dielectric layer by atomic layer deposition such that it overlies the first and second regions;

depositing a first gate electrode material over the first and second regions of the substrate;

removing first gate electrode material from over the first region without removing the barrier layer; and

depositing a second gate electrode material over the substrate, and  
defining a first and second electrode in the first and second region.